

The Integrated T&E Continuum, the Key to Acquisition Success

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The words “integrated” and “integration” have appeared for many years in their association with defense acquisition. Although integration has been discussed and written about extensively, making it happen has not been successful in such a non-integrated environment of multiple Services and agencies, multiple contractors, multiple responsible test organizations, and multiple customers. In 1983, Congress looked towards test and evaluation (T&E) officials to take a giant step toward integration in defense acquisition by incorporating responsibility for operational T&E with designated Service and agency Operational Test Agencies (OTAs), and the creation of the Director of Operational Test and Evaluation (DOT&E). This move created an integrated chain of testing, evaluating, and reporting at the completion of major defense acquisition programs (MDAPS) to the two customers of defense acquisition: 1) the warfighter who uses the equipment, and 2) Congress, representing the U.S. taxpayer who pays for the equipment. While this integration of responsibility and authority for operational T&E (OT&E) has been very effective, a drawback is that OT&E by nature requires test items that are near the completion of development so that they can be operated by their ultimate users in an operationally representative environment. Therefore, the majority of OT&E must be accomplished near the end of the development cycle. Here within lies the problem; too much “stuff happens” during the earlier, significantly non-integrated, developmental part of the acquisition process that the two key customers above have no knowledge of or influence over. The result is that OT&E becomes “discovery” of problems that could/should have been dealt with earlier in the process when they would have been much less significant. While integrated test and evaluation has been a recent focus with several policy statements issued, there was no pre-IOT&E stakeholder in place to ensure early integrated testing of systems. In 2009, Congress once again turned to T&E to integrate this part of the process as well with the creation of the office of the



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Director, Developmental Test and Evaluation (DDT&E). Thus the responsibility of the DDT&E is to assure that developmental test and evaluation (DT&E) is effective, visible, and integrated with OT&E to form a knowledge continuum throughout the entire development and acquisition process.

Integrated Testing is defined by OSD Memo, “Definition of Integrated Testing,” dated 25 April 2008, as follows: “the collaborative planning and collaborative execution of test phases and events to provide shared data in support of independent analysis, evaluation, and

reporting by all stakeholders, particularly the developmental (both contractor and government) and operational test and evaluation communities.”

From my perspective, the word “integrated” has four key meanings associated with defense acquisition. First, integrated T&E must be an integral part of development and acquisition. Effective and efficient development and acquisition absolutely requires extensive, timely, accurate, and impartial knowledge, and that is the product of good T&E. While the defense development and acquisition process has two customers, the warfighter and the U.S. taxpayer, T&E has a customer list that also includes the program manager, the contractors, the program management team, and the entire development team.

The second meaning of integrated T&E is that contractor and government DT&E must be planned and conducted in a manner such that there is no duplication of effort, facilities, personnel, or other resources. Integrated contractor and government T&E must also include the open sharing of test data in order to achieve efficiencies. Integrated contractor and government DT&E also describe a smooth and efficient transition from very early, mostly contractor conducted, highly technical testing of components and subsystems to the often more government conducted full system technical testing. Government and contractor integrated T&E throughout the entire development will assure a more streamlined and cost effective process and assure that the knowledge gained is used to the maximum extent possible to support

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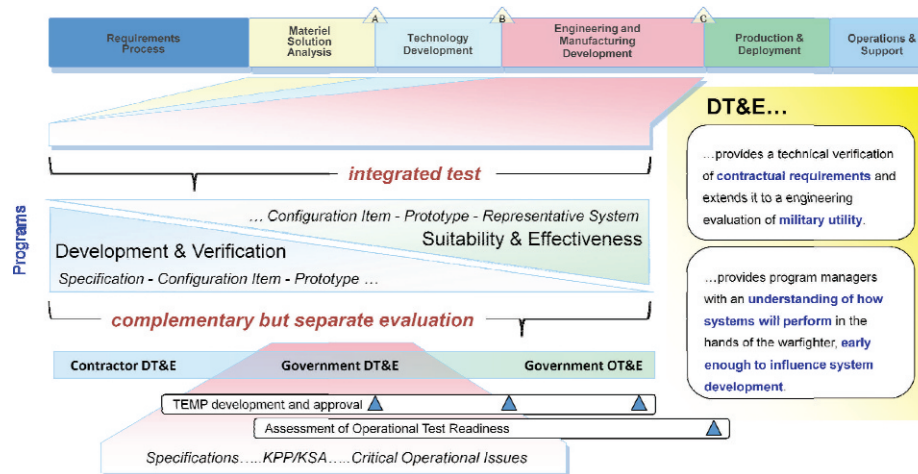


Figure 1. The Integrated T&E Continuum.

timely and cost effective development of effective equipment.

The third meaning of integrated T&E describes the continuance of a smooth and integrated flow of T&E from DT&E with and into OT&E. *Figure 1* shows the resulting continuum of T&E. This continuum ranges from pre-milestone A translation of user requirements to follow-on T&E (FOT&E) and product sustainment post-milestone C. The engineering and manufacturing development (EMD) phase of the system acquisition life cycle is a recognizable transition period from a subsystem engineering effort to a production-representative system evaluation effort. The full spectrum of integrated DT&E and OT&E becomes most evident during this phase, with government DT&E playing an increasingly important role. The government DT&E role, while complimentary to both systems engineering and operational test and evaluation efforts, requires an entirely different set of skills and resources than these other domains. Specifically these are engineering skills and resources focused on developing systems for subsequent operational test and employment. The integrated T&E continuum allows for efficiency across contractor DT&E, government DT&E, and government OT&E. As shown in the blue shaded triangle, systems engineering, when combined with (primarily) contractor test capability, excels at realizing system specifications in component level development. *Figure 1* depicts how this effort continues across the EMD phase, ultimately resulting in system-level prototypes. As the EMD phase progresses, the government test community starts to work with the contractor test community to gain insight into the suitability and effectiveness of the engineering design. DOT&E “owns” the assessment of

suitability and effectiveness and is most notably involved in pre-milestone C efforts with (early) operational assessments (OA). A T&E continuum integrates operational assessment with engineering focused verification of contractual requirements, an essential step to assure efficient development and acquisition of operationally effective and suitable systems.

DDT&E provides knowledge to support engineering verification of contractual requirements and engineering evaluation of military weapon systems. This knowledge supports the essential transition from how we expect the system to work to how the user needs it to work for successful employment. Not even the most robustly engineered set of requirements can fully capture the intent, interactions, or dynamics of the operational environment. Therefore, DDT&E provides program managers with an understanding of how systems will perform in the hands of the warfighter, early enough to influence system development. DOT&E provides the assessment of system effectiveness and suitability; however OTAs are not staffed to support daily interactions with the product development community. In addition, while OTAs do well at replicating the user environment, they are not resourced or trained to isolate engineering parameters within that environment and provide technical feedback for development. An integrated T&E continuum assures that both happen as and when they need to for maximum efficiency and effectiveness in system development and acquisition.

My fourth and final characteristic of the word “integrated” applies to my responsibility for bringing together and assuring adequacy of the multitude of capabilities essential to support good T&E for defense

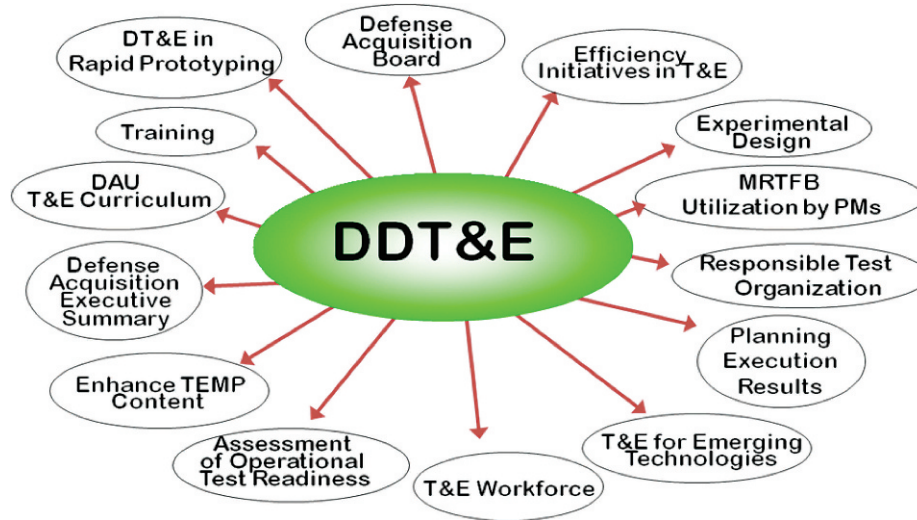


Figure 2. DDT&E Integrated Responsibility.

development and acquisition. As depicted in *Figure 2*, this responsibility ranges from well tested and understood maturing technologies, development and maintenance of a professional T&E workforce, a robust and efficiently utilized test base capability, thorough planning for integrated T&E throughout the entire acquisition program, well organized and responsible test organizations, to effective utilization of knowledge from T&E applied to key acquisition decisions. As part of execution of this responsibility, my organization is working with the Defense Acquisition University (DAU) to improve the T&E training and certification courses and the T&E portion of other related curricula. Another key part of the execution of my responsibility is to integrate and develop methodologies and best practices for T&E of emerging technologies. This includes infrastructure and processes to test hypersonic systems, directed energy weapons, non-lethal weapons, next generation UAVs, data fusion, anti-tamper, cyber, and complex multi-node mobile networks. DDT&E has a key role in the Secretary of Defense's (SECDEF's) efficiency initiatives, streamlining T&E planning and reporting processes and documentation. Closely aligned with this SECDEF initiative is our initiative to assess the cost of doing T&E business. Such an assessment will touch all of our areas of integrated responsibility and provide insights into improvement and metrics for continued monitoring. DDT&E is also committed to how DT&E can be highly focused to enhance, not delay, rapid acquisition. Overall, this integration of responsibility for policy, people, and infrastructure into a single organization positions DDT&E to contribute significantly to more effective and more responsive defense development and acquisition.

As we work together to implement and improve integrated T&E across the continuum, I ask for your help in meeting several key challenges that face the T&E community. Three of the more pressing challenges include T&E in the cyber world, achieving the right balance of T&E within Rapid Fielding, and achieving greater DoD efficiencies within T&E. We must harness the intellectual talent of our skilled workforce to understand and develop effective ways to test and assess system performance and assurance in the complicated world of cyber warfare. Within the initiative to rapidly field weapon systems to the warfighter, we cannot afford the proven and deliberate T&E methodology required in formal acquisition—we must find effective ways to quickly test and assess capabilities and limitations of systems as they are expedited to the front lines. And finally, we owe it to the end user to take a hard look at our processes, policies, and organizations to find significant efficiencies in the way we do business. These challenges must be met in order to deliver affordable weapon systems that work, and I ask your help in meeting these challenges.

Truly, integration is the golden key to successful (effective and efficient) defense development and acquisition. Because the T&E community and processes reach out and touch many key elements of defense development and acquisition, T&E is uniquely positioned to facilitate, guide, monitor, assess, and report the progress and effectiveness of this integration. DDT&E is a key organization within USD(AT&L) assuring that integrated T&E is conducted to significantly improve defense development and acquisition. Without a doubt, knowledge is the power to make it happen and T&E is the conduit for that knowledge. □

EDWARD R. GREER was sworn in as the Director of Developmental Test and Evaluation (DDT&E) on March 15, 2010. He serves as the principal advisor on developmental test and evaluation (DT&E) to the Director of Defense Research and Engineering and the Under Secretary of Defense for Acquisition, Technology and Logistics. Mr. Greer is responsible for developing and revising DT&E policy in support of the acquisition of major Department of Defense (DoD) weapon systems. Other significant duties include reviewing and improving the organization and capabilities of the military departments with respect to DT&E and providing advocacy, oversight, and guidance to elements of the acquisition workforce responsible for DT&E.

Prior to this political appointment and since 2002, Mr. Greer served as the Deputy Assistant Commander for Test and Evaluation (AIR 5.0A), Naval Air Systems Command and Executive Director, Naval Air Warfare Center Aircraft Division (NAWCAD), Patuxent River, MD. As the senior civilian for naval aviation T&E, Mr. Greer was responsible for planning, executing, analyzing, and reporting of all naval aviation T&E spanning a workforce of 6,600 and an operating budget of almost \$1B. As executive director, NAWCAD, responsibilities included ensuring that NAWCAD technical, business, and financial objectives were met across a workforce of 14,400 and a total operating budget of over \$4 billion.

Mr. Greer joined the senior executive service (SES) in

1998 as director of the Atlantic Ranges and Facilities, NAWCAD, responsible for all facets relating to the development, maintenance, and operation of the range and test facility components of the Navy's principal air combat systems test activity.

From 1995 to 1998, Mr. Greer served as principal deputy program manager of Airborne Strategic Command, Control, Communications; Program Executive Office for Air, Antisubmarine Warfare, Assault & Special Mission Programs. Mr. Greer was responsible for all aspects of acquisition including systems engineering, logistics, training systems and T&E. From 1993 to 1995, Mr. Greer took an assignment in the Pentagon as a staff specialist in the Office of Under Secretary of Defense for Acquisition and Technology, Test, Systems Engineering and Evaluation; Test Facilities and Resources. Prior to 1993, Mr. Greer served in various leadership and engineering positions within the Naval Air Systems Command and was the Navy's representative on the 2007 Defense Science Board Task Force on Developmental Test and Evaluation.

Mr. Greer is a past president of the Southern Maryland Chapter of ITEA. He earned his bachelor of science degree in electrical engineering from the University of Maryland, College Park and received a masters of science degree in management from the Florida Institute of Technology. Mr. Greer is also a graduate of the Defense Systems Management College Program Management Course. E-mail: cdbrown.gm@gmail.com.